Interney Docket No.: 17795 [TYCO-6]

What is claimed is:

1 \(\)\. A substrate for an area array package,

said substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

said substrate having a ground structure including, for each signal wiring, a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring, and

said substrate having a plurality of ground via holes through the substrate, including at least one respective ground via hole through each rectangular ground plane portion.

- 2. The substrate according to claim 1, wherein each ground plane portion has a plurality of ground via holes therethrough.
- The substrate according to claim 1, wherein for each second contact, the
  respective ground plane portions are connected by a third ground plane portion on a third
  side of the second contact.
- 1 4. The substrate according to claim 3, wherein the third ground plane portion has a plurality of ground via holes therethrough.
- 5. The substrate according to claim 3, wherein the third ground plane portions of each second contact on at least a side of the substrate are continuously connected.
- 1 6. The substrate according to claim 1, wherein each pair of adjacent ones of the second contacts have a single rectangular ground plane portion therebetween.
- 1 7. The substrate according to claim 1, wherein the substrate has an opening
- 2 therethrough sized and shaped to receive the integrated circuit.

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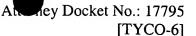
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1	8. An area array package comprising:
2	a substrate having:
3	a plurality of signal wirings, each having a first contact adapted to
4	be connected to a respective terminal of an integrated circuit, and a second
5	contact on a periphery of the substrate,
6	a ground structure including, for each signal wiring, a pair of
7	rectangular ground plane portions located on opposite sides of the second
8	contact of that signal wiring, and
9	a plurality of ground vias through the substrate, including at least
10	one respective ground via hole through each rectangular ground plane
11	portion;
12	a cover above the substrate, and
13	a bottom layer of the package formed of a dielectric material.
1	9. The package of claim 8, further comprising an intermediate dielectric layer
2	between the bottom layer and the substrate, the intermediate dielectric layer having an
3	additional ground structure thereon.
1	10. The police of ale in 0 ft al. 1 to 1 t
1	10. The package of claim 9, further comprising a third ground structure between the
2	bottom layer and the intermediate layer.
1	The package of claim 9, wherein the additional ground structure has a ground
2	opening around a signal via that is coupled to the second contact, the ground opening
3	being generally shaped like a rectangle with two mitered corners.
	generally endped and a rectangle with two interest contents.
1	12. The package of claim 8, wherein the package has a signal via beneath each second
2	contact, and a ground via beneath each ground via hole, each of the signal vias and
3	ground vias being electrically connected to a respective solder attach pad on the bottom
4	layer.
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1	13. The package of claim 12, wherein each signal via is surrounded on three sides.

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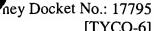
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1	14.	The package of claim 13	, wherein each signal via	a is surrounded by at least seven
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- 2 ground vias
- 1 15. The package of claim 8, further comprising a superstrate above the substrate, the
- 2 superstrate generally being formed of the same material as the substrate.
- 1 16. The package of claim 15, wherein the superstrate has an opening therethrough
- 2 above each second contact.
- 1 17. The package of claim 16, wherein the opening above each second contact is
- 2 cylindrical and is greater in diameter than the ground vias.
- 1 18. The package of claim 16, wherein the opening above each second contact is filled
- with a material having a sufficiently low dielectric constant to reduce the radiation from a
- 3 region of the second contact significantly.
  - 19. The package of claim 8, wherein the package includes a plurality of pockets, each pocket shaped and sized to accommodate an integrated circuit.
  - 20 A printed circuit board assembly, comprising:
- 2 a printed circuit board having a circuit board substrate with circuit traces and a
- 3 plurality of devices thereon, said plurality of devices including at least one integrated
- 4 circuit package assembly that includes:
- 5 a package substrate having:
- 6 a plurality of signal wirings, each having a first contact adapted to
- be connected to a respective terminal of an integrated circuit, and a second
- 8 contact on a periphery of the package substrate,
- 9 a ground structure including, for each signal wiring, a pair of
- rectangular ground plane portions located on opposite sides of the second
- 11 contact of that signal wiring, and



12	a plurality of ground vias through the package substrate, including
13	at least one respective ground via hole through each rectangular ground
14	plane portion;
15	a lid above the package substrate, and
16	a bottom layer of the package formed of a dielectric material, the bottom layer
17	having a plurality of solder attach pads, electrically connected to contacts of the circuit

21. An area array package comprising:

board substrate.

a substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate, the substrate having a signal via penetrating each second

5 contact;

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a superstrate formed of a dielectric material above the substrate, the superstrate having a respective opening therethrough above each second contact;

a lid above the superstrate; and

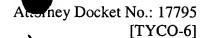
a bottom layer of the package formed of a dielectric material.

- 1 22. The package of claim 21, wherein the opening above each second contact is cylindrical and is greater in diameter than the ground vias. 2
- 1 23. The package of claim 21, wherein the superstrate is formed of the same material 2 as the substrate.
- The package of claim 21, wherein the substrate has a plurality of ground vias 1 24.
- 2 therethrough, at least partially surrounding each of the signal vias.
- 1 The package of claim 24, wherein the substrate has a plurality of rectangular
- 2 ground plane portions surrounding each of the signal vias on three sides, the ground vias

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- 3 enetrating the ground plane portions.
- 1 A method for forming an area array package comprising the steps of:







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forming a plurality of signal wirings on a substrate, each signal wiring having a
first contact adapted to be connected to a respective terminal of an integrated circuit, and
a second contact on a periphery of the substrate, the substrate being formed of a type of
material suitable for use in a printed circuit board;

forming on a bottom layer of the area array package a plurality of solder attach pads aligned with the plurality of second contacts;

forming a plurality of signal via holes penetrating the second contacts and solder attach pads and penetrating through the substrate and the bottom layer;

filling the signal via holes with a conductive liquid capable of solidifying; and solidifying the conductive liquid to form conductive signal vias.

- 27. The method of claim 26, further comprising plating the conductive vias.
- 28. The method of claim 26, further comprising forming ground regions on the substrate;

forming on the bottom layer a plurality of ground solder attach pads aligned with the plurality of ground regions;

forming a plurality of ground via holes penetrating the ground regions and ground solder attach pads and penetrating through the substrate and the bottom layer;

filling the ground via holes with additional conductive liquid capable of solidifying; and

solidifying the additional conductive liquid to form conductive ground vias.

- 29. The method of claim 26, wherein:
- the substrate is formed of a material comprising PTFE with a ceramic filler, and the bottom layer is formed of a glass reinforced hydrocarbon/ceramic laminate.
- 1 30. The method of claim 29, further comprising attaching a superstrate above the
- 2 substrate, the superstrate generally being formed of the same material as the substrate.
- 1 31. The method of claim 29, further comprising attaching a lid above the substrate,
- 2 the hid being formed of FR4 or similar epoxy glass laminate.